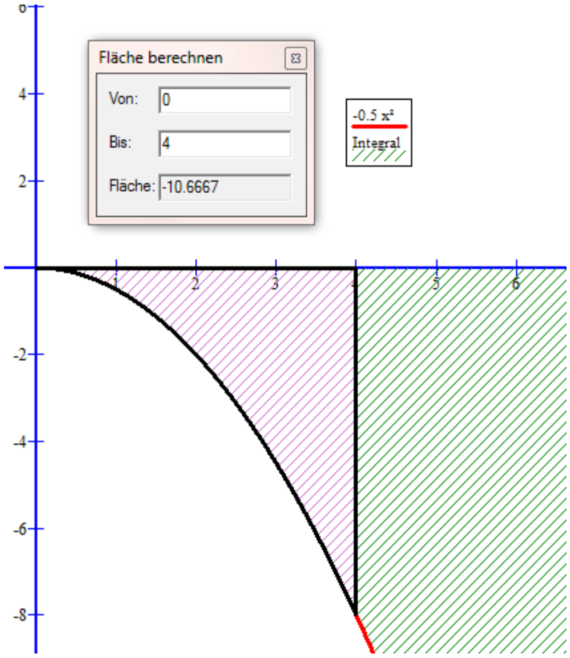
Paula Helming
Klasse 12.1
14.09.10

1. $f(x) = -0.5x^2 \quad I=[0;4]$

$F(x) = -\frac{1}{6}x^3 + C$

$\int_0^4 -0.5x^2\,dx = F(4) = -\frac{1}{6}(4)^3 = -\frac{32}{3} = -10.6667$

$A = \frac{32}{3} = 10.6667\ FE$

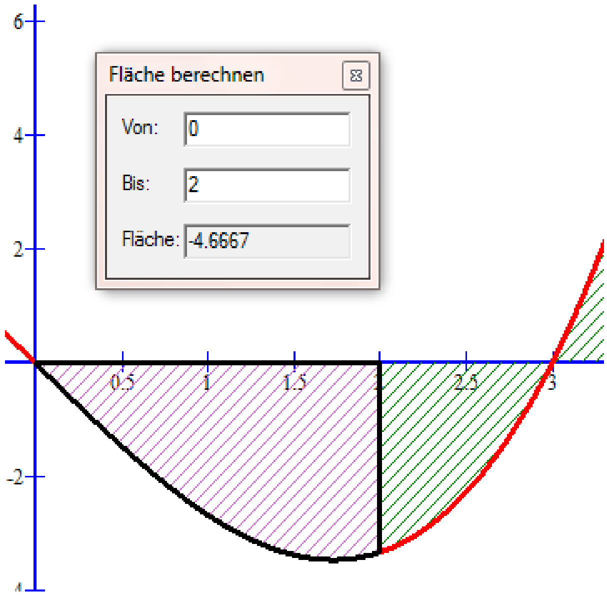


2. $f(x) = \frac{1}{3}x^3 - 3x \quad I=[0;2]$

$F(x) = \frac{1}{12}x^4 - \frac{3}{2}x^2 + C$

$\int_0^2 \frac{1}{3}x^3 - 3x\,dx = \frac{1}{12}(2)^4 - \frac{3}{2}(2)^2 = -\frac{14}{3} = -4.667$

$A = \frac{14}{3} = 4.6667\ FE$



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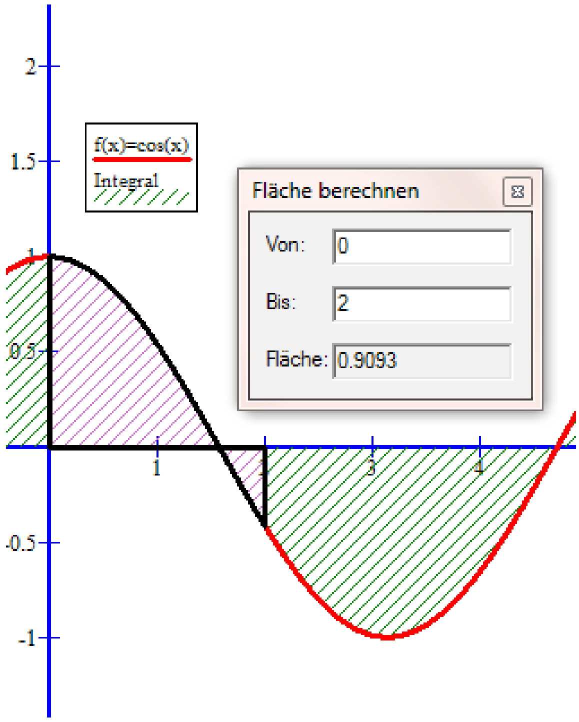
3. $f(x)=\cos(x)$ I=[0;2]

$F(x)=\sin(x)+C$

$Nullstelle:$
$f(x)=\cos(x)=0$
$x=\cos^{-1}(0)=\frac{1}{2}\pi$

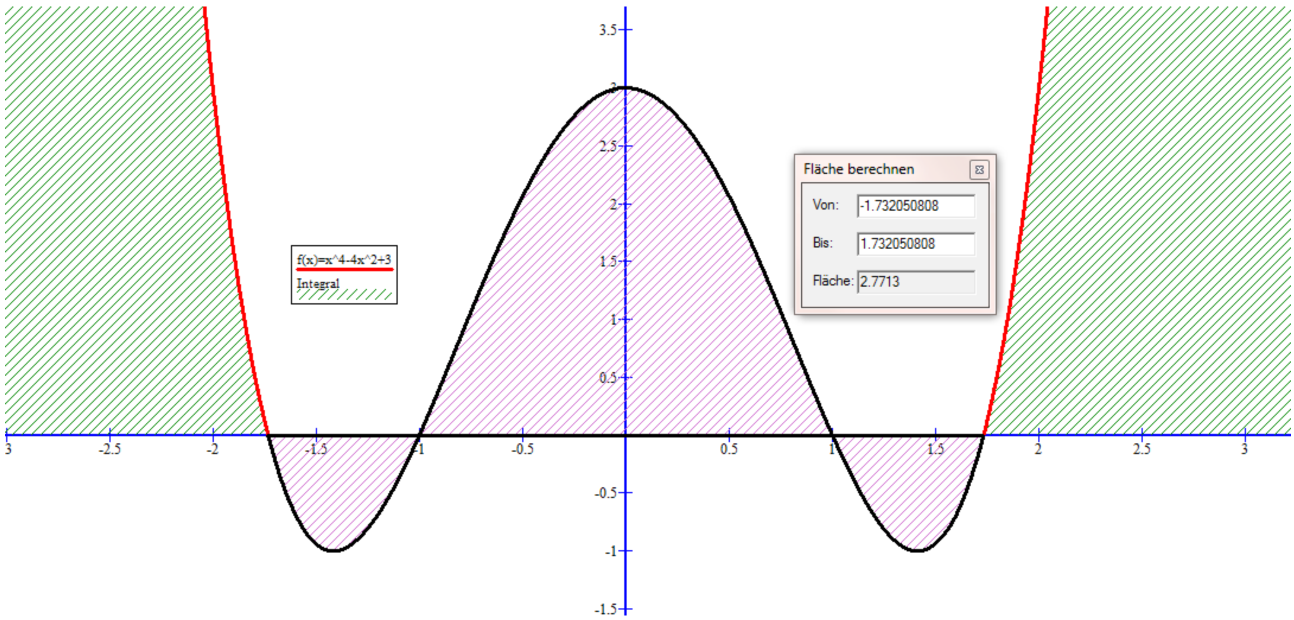
$$A=\int_0^{\frac{\pi}{2}}\cos(x)-\int_{\frac{\pi}{2}}^{2}\cos(x)dx$$

$A=\sin(\frac{\pi}{2})-[\sin(2)-\sin(\frac{\pi}{2})]$
$A=1-(-0.0907)$
$A=1.0907\,FE$



4. $f(x)=x^4-4x^2+3$ I=[-√3;√3]

$F(x)=\frac{1}{5}x^5-\frac{4}{3}x^3+3x+C$



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$$\frac{A}{2}=\int_0^1 x^4-4x^2+3\,dx-\int_1^{\sqrt{3}} x^4-4x^2+3\,dx$$

$$\frac{A}{2}=[\frac{1}{5}(1)^5-\frac{4}{3}(1)^3+3(1)]-[(\frac{1}{5}(\sqrt{3})^5-\frac{4}{3}(\sqrt{3})^3+3(\sqrt{3}))-(\frac{1}{5}(1)^5-\frac{4}{3}(1)^3+3(1))]$$

$$\frac{A}{2}=1.8667-(-0.4810)$$

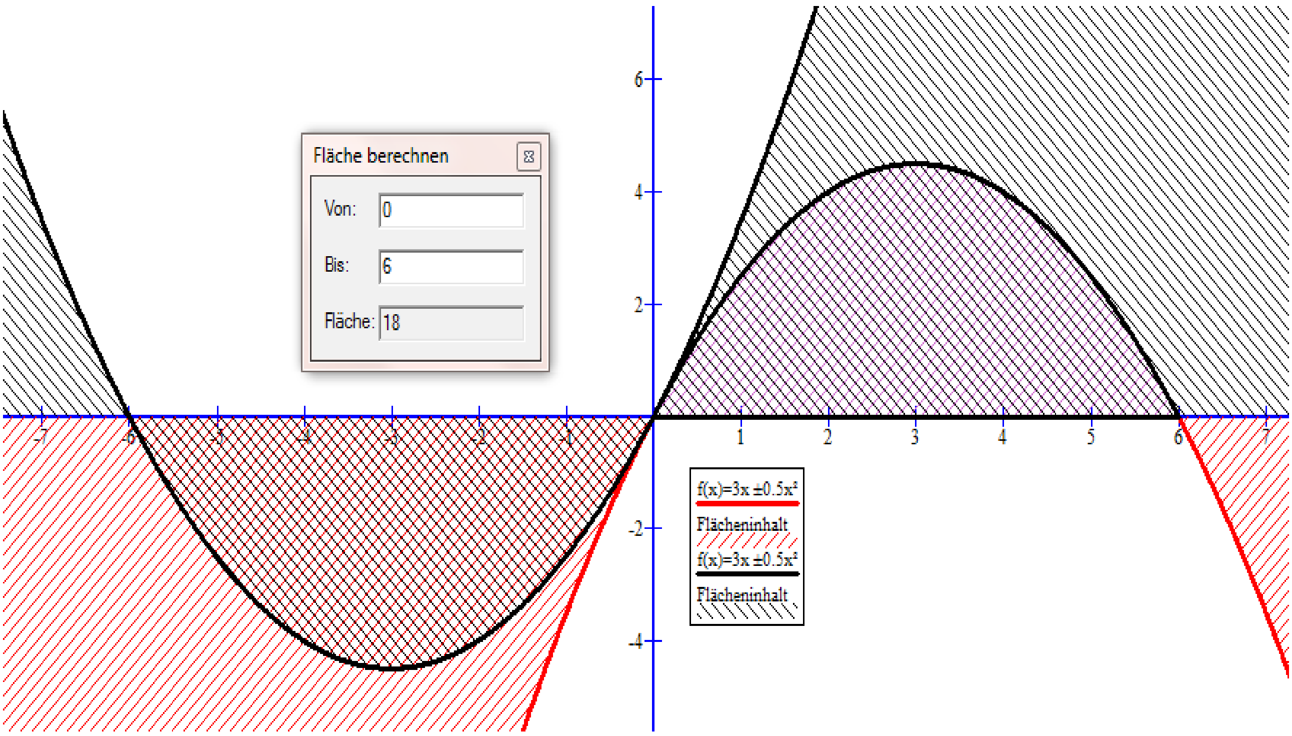
$$\frac{A}{2}=2.3477$$

$$A=4.6954\,FE$$

5. $f(x)=3x-kx^2$ **,** Bestimme k so, dass der Graph von f mit der x-Achse den Flächeninhalt A=18 FE hat.

$$(3x-kx^2)\div(x-0)=(3-kx)$$

$$\rightarrow f(x)=3x-kx^2=(3-kx)(x)$$



$$\int_0^{3/k} 3x-kx^2=\frac{3}{2}(\frac{3}{k})^2-\frac{k}{3}(\frac{3}{k})^3=\frac{3}{2}(\frac{9}{k^2})-\frac{k}{3}(\frac{27}{k^3})=\frac{27}{2k^2}-\frac{27k}{3k^3}=\frac{27}{2k^2}-\frac{9}{k^2}=\frac{27}{2k^2}-\frac{18}{2k^2}=\frac{9}{2k^2}=18\,FE$$

$$36k^2=9$$

$$k^2=\frac{1}{4} \qquad \rightarrow f(x)=3x\pm\frac{1}{2}$$

$$k=\pm\frac{1}{2}$$